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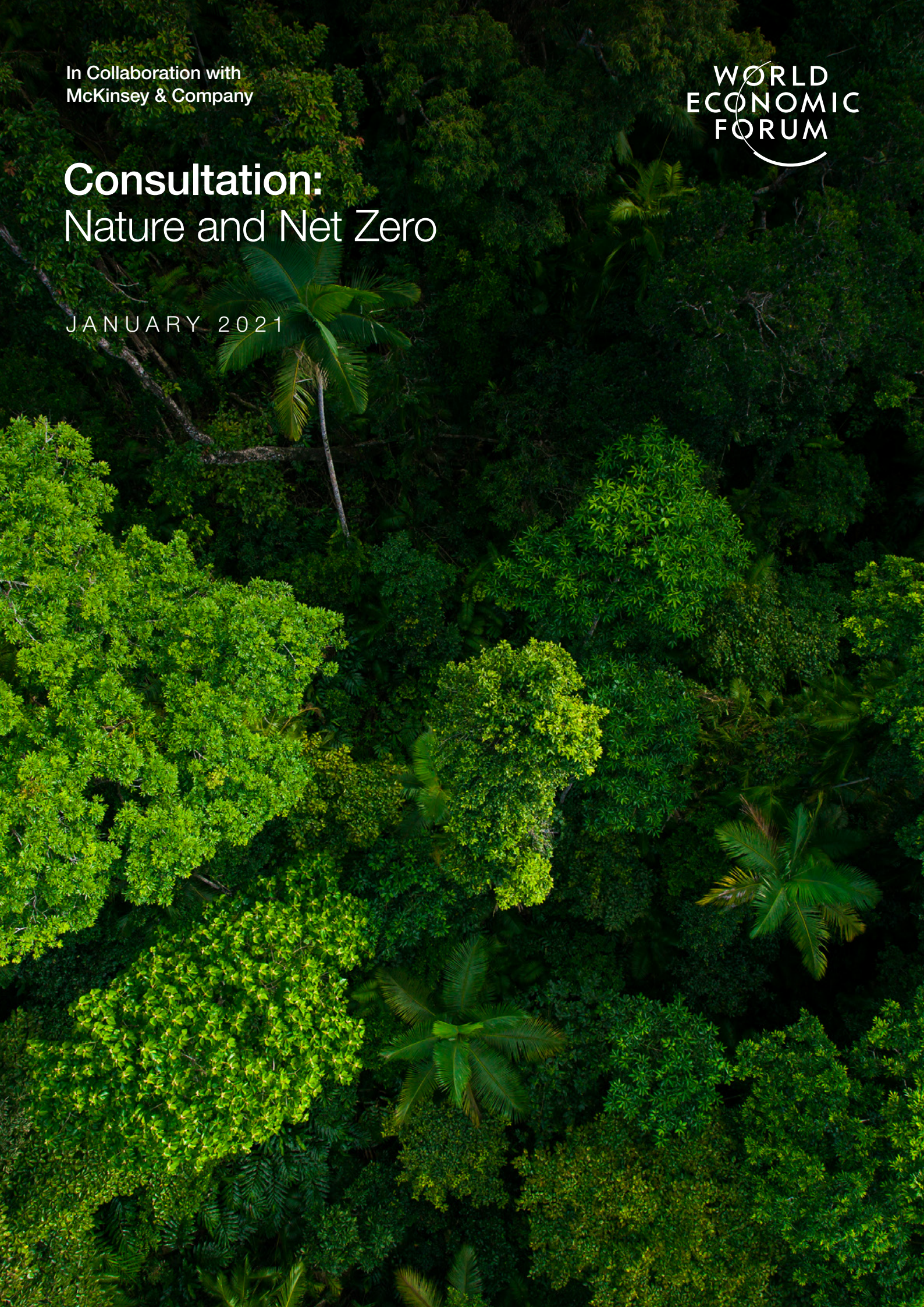
WORLD ECONOMIC FORUM

Consultation:
Nature and Net Zero

JANUARY 2021



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Foreword

Bill Winters
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As the world starts to look beyond the COVID-19 pandemic, there is a compelling case to address the climate crisis in the context of the global recovery and reconstruction effort. Awareness is growing, across businesses and among citizens, that tackling climate change is inextricably linked to another urgent environmental crisis: the accelerating destruction of nature. Natural climate solutions (NCS) – investment in conservation and land management programmes that increase carbon storage and reduce carbon emissions – offer an important way of addressing both crises simultaneously.

Greenhouse gas emissions from agriculture, forestry and other land use contribute to about a quarter of global emissions, and it is estimated that NCS projects can help deliver around one-third of net emission reductions needed by 2030. However, despite their vast potential for reducing emissions, natural climate solutions attract very little public investment.

I welcome this report by the World Economic Forum and McKinsey exploring the opportunities and challenges involved in NCS. It builds on the work of the Taskforce on Scaling Voluntary Carbon Markets, which I am pleased to Chair and whose final report setting out a blueprint for infrastructure and mechanisms to achieve rapidly rising investment in nature was published on 25 January. Together, these documents provide clear and detailed guidance on the role business can play in curbing climate change, through making commitments to align with the Paris Agreement; reporting annually on their emissions and those produced in their value chains using accepted standards; and compensating a share of unabated emissions through the purchase and retirement of carbon credits.

Natural climate solutions are crucial tools in this transition process, provided they are underpinned by internationally accepted principles and rules to ensure that they genuinely deliver emission reductions/sequestration, and to increase public acceptance of carbon offsetting as a vital element of the climate transition. This cannot be at the expense of accelerating decarbonization of business models. We need to drive adoption of available solutions and also invest in new technologies that create viable options for hard-to-abate sectors.

This report sheds light on the significant co-benefits of NCS to nature and humanity. Carbon market participants are increasingly recognizing these broader benefits. Not least of these is the flow of private capital they can generate to countries that offer the highest potential for NCS projects, typically forest-rich countries in the Global South.

The report shows how NCS are being prevented from fulfilling their potential at scale by conceptual and technical hurdles. The lack of consensus on how to treat corporate carbon reduction claims and on the role that NCS can play needs to be addressed. Agreement is required on standards and certification under one commonly accepted international standards body. Continuing public concerns about the validity of NCS credits should be addressed through highlighting and sharing best practice. I see this work, alongside that of the Taskforce on Scaling Voluntary Carbon Markets, as a call to action on the part of all stakeholders to tackle these hurdles.

I look forward to seeing stakeholders respond to this challenge by charting a course to realize a significant increase in investment in nature. This year, as we prepare for COP26, is the time for action.

Executive summary

Natural climate solutions offer an opportunity to address both climate and nature crises and generate significant additional environmental, social and economic benefits.

- The world faces converging environmental crises that are inextricably linked and compounding: the accelerating destruction of nature and climate change. Natural climate solutions (NCS) offer an opportunity to address both and generate significant additional environmental, social and economic benefits.
- Private-sector commitment to action is gaining momentum, with many companies setting the goal of reaching net-zero emissions and some also making commitments on nature. As a result, NCS are gaining attention and carbon markets are growing fast. Corporate strategies that aim to use NCS to help deliver a net-zero pathway are on the verge of becoming mainstream.
- NCS are fundamental to delivering a net-zero pathway alongside rapid decarbonization, by enabling avoidance/reduction of emissions, and removal/sequestration of carbon dioxide from the atmosphere.
- Reaching a 1.5° or 2°C pathway by 2030 will require about a 50% net-emission reduction of annual emissions to around 23 gigatons of carbon dioxide (Gt CO_2) from 2019 levels.
- We estimate a practical potential of close to 7Gt CO_2 per year from NCS projects, sufficient to deliver around one-third of that target and to achieve carbon removal in the near term and at lower cost than technological solutions. The bulk of this total comprises four types of NCS: avoided deforestation and peatland impact, peatland restoration, reforestation and cover crops.
- NCS are typically low-cost sources of carbon abatement. In most cases, costs are between $10 and $40 per ton of CO_2 with variations between geographies and project types.
- Beyond helping to address the changing climate, NCS can also deliver significant co-benefits to nature and humanity, and can generate private capital flows to countries that offer the highest potential for NCS projects, typically forest-rich countries in the Global South.
- However, NCS are being held back from fulfilling their potential at scale by various conceptual and technical hurdles, starting with a lack of consensus on how to treat corporate carbon reduction claims and on the role that NCS can play. Agreement is needed on standards and certification under one commonly accepted international standards body. Continuing public concerns about the validity of NCS credits should be addressed through highlighting and sharing best practices.
- To overcome years of oversupply of carbon credits and low prices, a demand signal is needed to build confidence and unlock the supply pipeline of potential NCS projects.
- Market architecture, infrastructure and financing need to be developed to support the growth of NCS producing tradable credits, as set out in the recent report of the Taskforce on Scaling Voluntary Carbon Markets (TSVCM).
- Finally, it is vital to build coherent and agreed policy frameworks at either the national or international level for the growth of NCS in line with climate goals, covering such issues as carbon standards, rules on accounting at the jurisdictional or project level, and connecting voluntary and compliance markets.
- This demands a concerted effort to build trust and a broad consensus on the value of NCS to address the lack of confidence in the integrity of NCS credits, the markets, and the institutions that govern them. On the one hand, there is a need to increase public awareness, while on the other, it is critical to create multistakeholder communities of trust to air and address conceptual differences.

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Introduction: converging crises and the need for a sustainable recovery

NCS should be an integral component of economic strategies to ensure a “green recovery” from the ravages of COVID-19.

As the world emerges from the health and economic crises caused by COVID-19, we face converging environmental crises: the accelerating destruction of nature and climate change. These crises are inextricably linked and compounding.

Although the benefits are often hidden, nature sustains over half of the global economy – it ensures food security and supports water cycles; it protects communities from floods, fires and disease; and it helps mitigate climate change by absorbing carbon dioxide, and, in some cases, providing resilience against the impacts of climate change.[1] But this stock of natural assets, the planet's balance sheet, is finite and dwindling. The need for action is pressing: 32% of the world's forests have been destroyed, 40% of invertebrate pollinators face extinction, and there has been a 23% reduction in land surface productivity due to land degradation.[2] This drawdown on natural capital is unsustainable, accelerating climate change, reducing resiliency and broadening challenges to the availability of fresh water, clean air, fertile soil and abundant biodiversity.

Meanwhile, climate change is having a substantial impact across the world – and is likely to increase in a non-linear fashion. Rising temperatures, disrupted water supplies and flooding will displace tens of millions of people. While today there are tens of millions of environmental migrants, by 2050 approximately one billion people will live in countries that do not have the resilience to deal with expected ecological changes.[3]

Drought and extreme weather events will threaten food production and supply chains. In 2020 alone, fires ravaged multiple countries. In Australia, one-fifth of the continent's entire temperate broadleaf and mixed forest biome was destroyed;[4] in California, wildfires burned more land in 2020 than any year on record – nearly five times the five-year average;[5] Brazil, Ukraine and Russia also suffered extensive fires.

The Paris Agreement is unequivocal: If we are to significantly reduce the risks and impacts of climate change, we must hold the increase in the global average temperature to well below 2° Celsius above pre-industrial levels and endeavour to limit the temperature increase to 1.5°C.[6]

This report outlines the potential for NCS to address the converging crises of climate change and nature loss, while also helping to deliver sustainable development in line with the United Nations Sustainable Development Goals (SDGs) – providing equitable livelihoods, advancing education and equality, and improving natural resource management. With close to 7Gt CO_2 in annual potential by 2030, assuming an illustrative price per ton of $20 would suggest potential capital flows greater than $100 billion, with opportunity across the world, especially in the Global South.[7] Consequently, nature more broadly, and NCS specifically, should be an integral component of economic strategies to ensure a "green recovery" from the ravages of COVID-19.

This research should be seen within the broader context of the need to scale investment in climate and nature, as described recently by the Taskforce on Scaling Voluntary Carbon Markets (TSVCM) and the World Economic Forum's New Nature Economy report series. The following discussion paper sets out an action agenda to accelerate the scale-up of high-quality NCS and unlock markets through the combined efforts of business leaders, policy-makers and civil society. This first consultation paper seeks to create discussion with stakeholders on the role of NCS to mitigate both climate and nature crises, as well as appropriate implementation strategies to build trust and confidence in the market.

"The following discussion paper sets out an action agenda to accelerate the scale-up of high-quality NCS and unlock markets through the combined efforts of business leaders, policy-makers and civil society.

BOX 1

About natural climate solutions

Natural climate solutions (NCS) are "conservation, restoration and improved land management actions that increase carbon storage and/or avoid greenhouse gas emissions".[8] NCS therefore play a role in avoiding/reducing emissions by, for instance, avoiding deforestation, and removing/sequestering emissions such as through restoring peatlands as part of climate-mitigation pathways.

NCS have environmental and financial attractions. Many NCS have low costs compared to other climate mitigation options, as well as environmental, social and economic co-benefits such as safeguarding biodiversity, securing water supplies and providing jobs for local communities.

Ability to mitigate climate change

Environmental, social and economic co-benefits

Economically attractive

Below: Getty Images

1 New commitments: corporate climate action is accelerating investments in nature

Private-sector commitment to climate action is gaining momentum. Many companies are setting net-zero goals to drive low-carbon strategies and address the business risks and opportunities they face. Risks include those across their value chain – disrupted supply chains and volatile prices of raw materials, for example – resulting from extreme weather events and other climate effects (physical risks), as well as regulatory and reputational risks that arise through shifts to greener economies (transition risks).[9] Their customers are meanwhile demanding climate-friendly products and services, presenting companies that are perceived to fail to act with potential loss of business. Investors are demanding action as well: In his 2020 CEO letter, Larry Fink, chief executive officer of BlackRock, wrote, "Every government, company, and shareholder must confront climate change", in a call to action from the world's largest asset manager with almost $8 trillion under management.[10]

"The call is being heard: Net-zero commitments by companies have more than doubled in the past year and the scale of NCS and offset pledges within these commitments is rising accordingly.

The call is being heard: Net-zero commitments by companies have more than doubled in the past year and the scale of NCS and offset pledges within these commitments is rising accordingly.[11] Based on net-zero commitments today from more than 700 of the world's largest companies, there have already been commitments of around 0.2Gt CO_2 of carbon credits by 2030.[12] For instance, industry-level action in the aviation and oil and gas sectors has accelerated commitments to net zero, with American Airlines, Shell and bp among those with net-zero pledges.

The actual demand for carbon credits based on a company's commitments is intricately linked with the claims a company is able to make. Today, those making net-zero claims are expected to reduce their emissions where possible, and neutralize by retiring an equivalent amount of carbon credits or investing directly in carbon removals. The precise definition and requirements of various claims are not yet clear (see Key Action #1). The ambition of these claims varies across companies. For example, Microsoft has set a high bar by committing to remove all historical emissions since its inception in 1975.

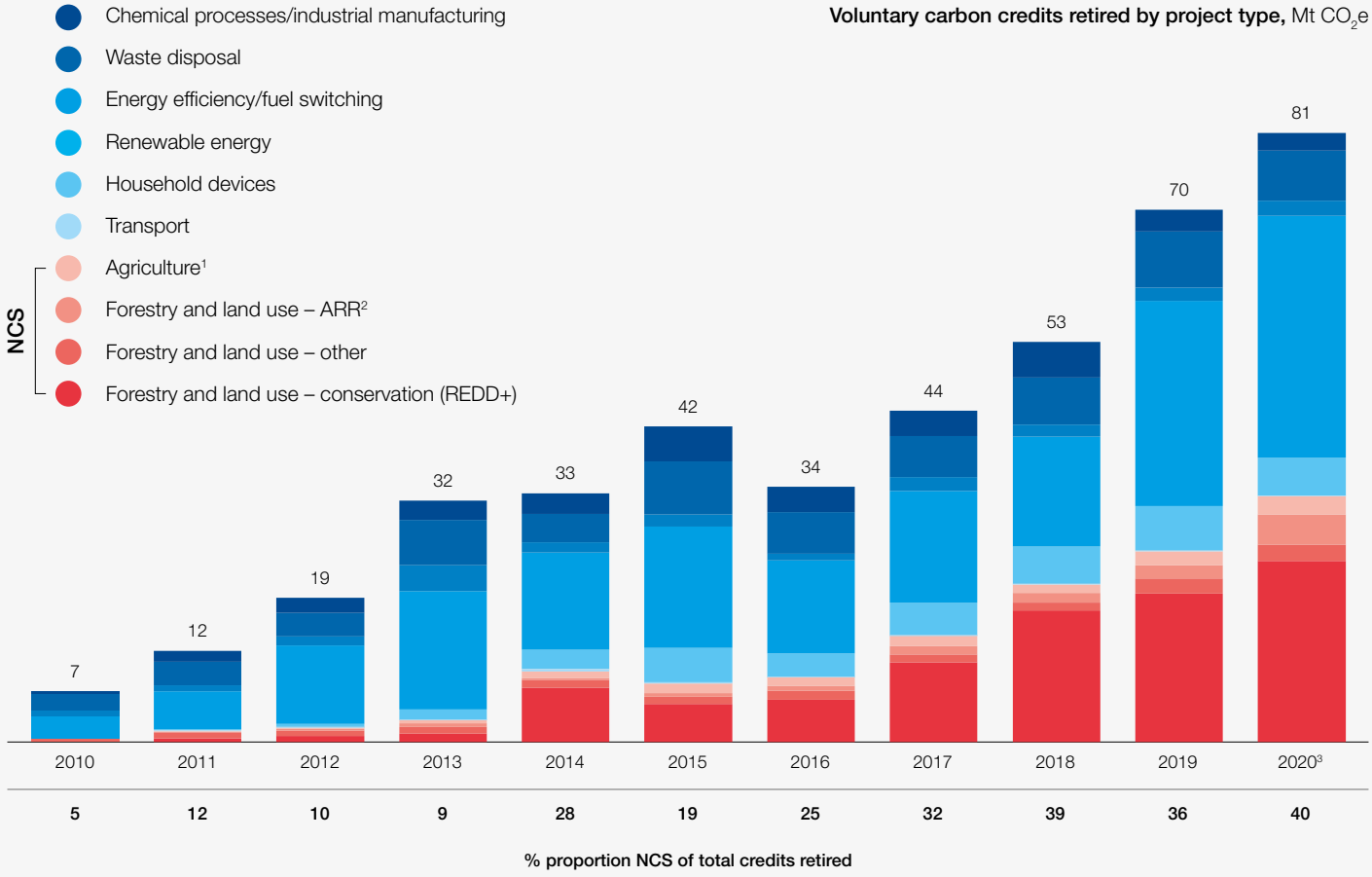
Alongside the potential use of NCS to satisfy demand for carbon credits, leaders are also investing directly in nature. For example, Amazon is investing $10 million to restore 1.6 million hectares (Mha) of forest in the United States, Nestlé is investing in ending deforestation and forest restoration in Ghana and Côte d'Ivoire, and Shell is planting 5 million trees in the Netherlands, among other climate commitments.[13] Walmart has pledged to be net zero in operations by 2040, and to manage or restore 50 million acres of land and

1 million square miles of ocean. Within their net-zero commitments, companies such as Unilever and PepsiCo have committed specifically to NCS, recognizing the importance of engaging with farmers and growers across the value chain who are critical to protecting and restoring landscapes and forests.

Beyond the specific and largely voluntary actions of the private sector, governments are committing as well: 65% of global CO_2 emissions are produced in countries with a net-zero target announced.[14] China, the world's largest CO_2 emitter, has committed to net-zero emissions by 2060. And if the Biden administration adopts a net-zero target, 50% of the top 10 emitters will have done so.

In sum, NCS are garnering more and more attention as an integral component of climate change ambition. While undersized overall, voluntary carbon markets provide an important indication of demand. In 2010, NCS accounted for 5% of carbon credits, and now account for around 40% (Figure 1).[15] Strategies designed to deliver a net-zero pathway with NCS at their core are becoming mainstream if not yet commonplace.

FIGURE 1 **Demand for NCS credits has increased over the past 10 years**



Notes: [1] We include all projects listed as "Agriculture" as NCS here for simplicity. However, in practice a portion of these projects are not NCS, e.g. emissions reductions through anaerobic digesters.

[2] Afforestation, reforestation and revegetation.

[3] Data from January–November; does not include forecast to year end.

Source: McKinsey analysis of public registries data including ACR, CAR, GS, Plan Vivo, VCS

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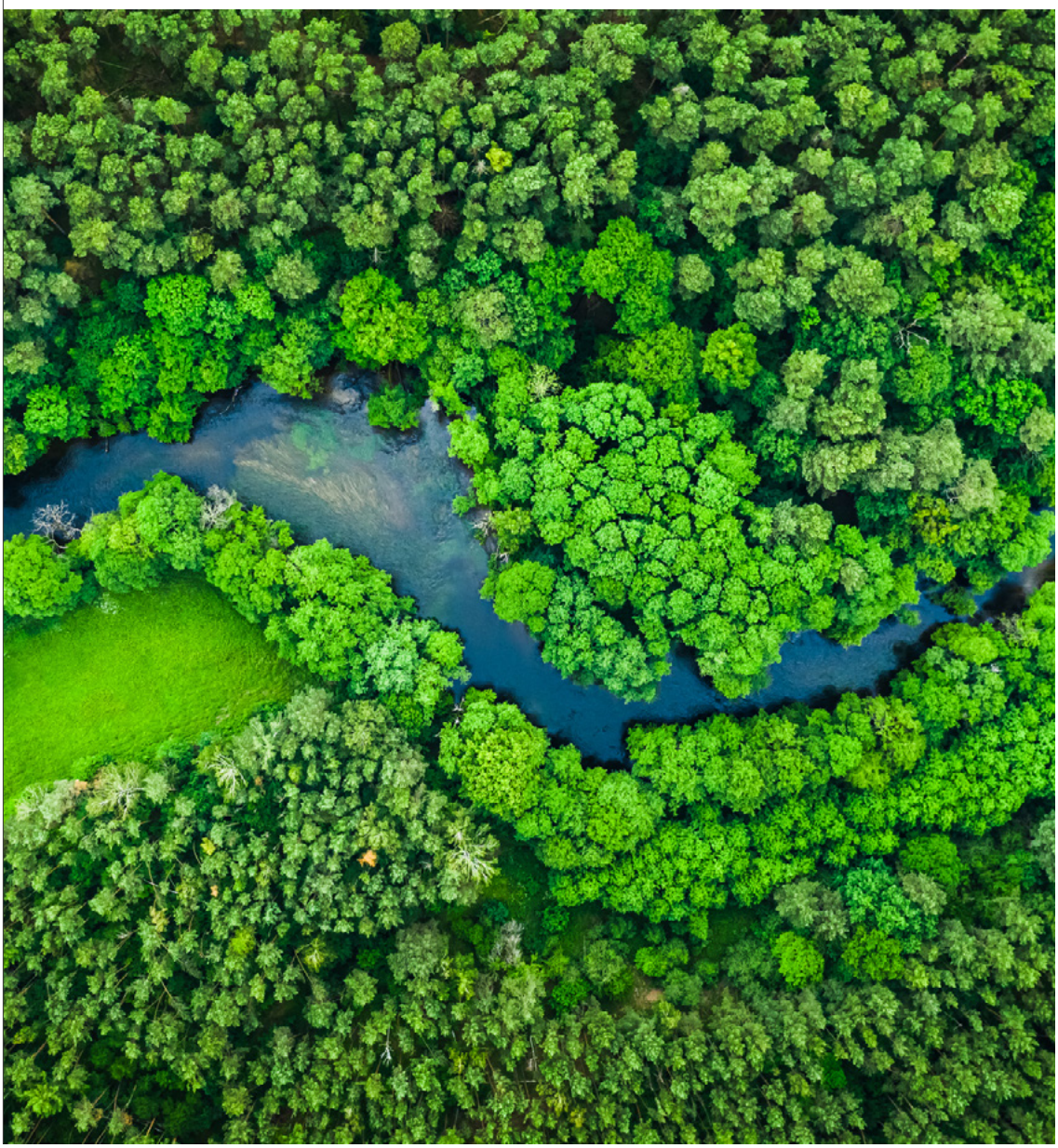
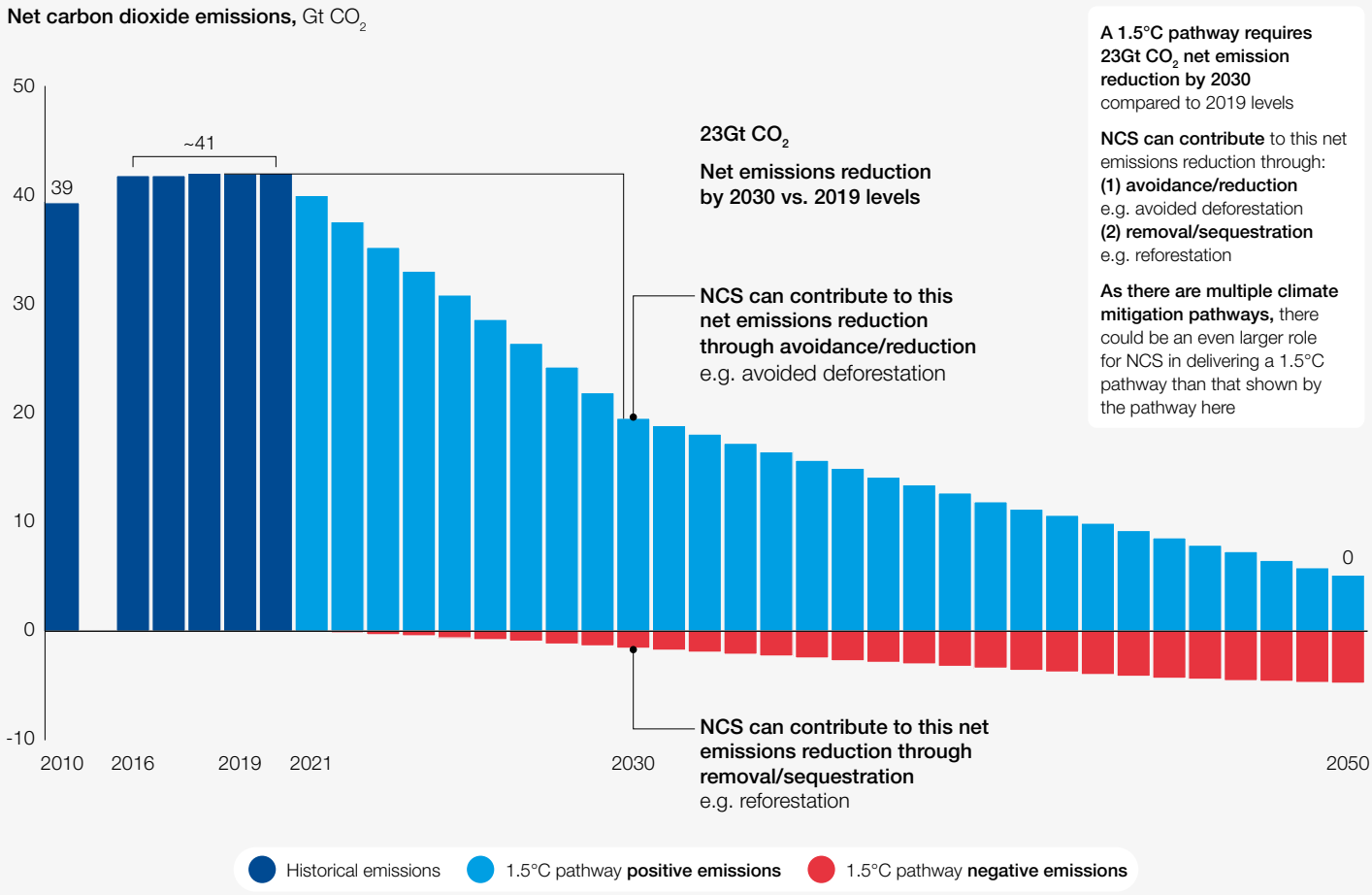
2 Nature: the key to achieving net-zero



There is no clear path to deliver climate mitigation without investing in nature. Limiting climate change to safe levels requires both: (1) avoidance/reduction of emissions; and (2) removal/sequestration of carbon dioxide from the atmosphere.

While exact estimates vary based on climate mitigation pathway modelling, if we are to reach a 1.5°C or 2°C pathway by 2030, we require about a 50% net emission reduction of 23Gt CO_2 by that date from 2019 levels (Figure 2).[16] NCS could deliver up to one-third of this net emission reduction (Figure 3).

FIGURE 2 **A 1.5°C pathway requires 23Gt CO_2 net emission reduction by 2030 compared to 2019 levels**



Source: McKinsey 1.5°C Scenario Analysis (Scenario A) IPCC Special Report on 1.5°C, Le Quéré et al., 2018

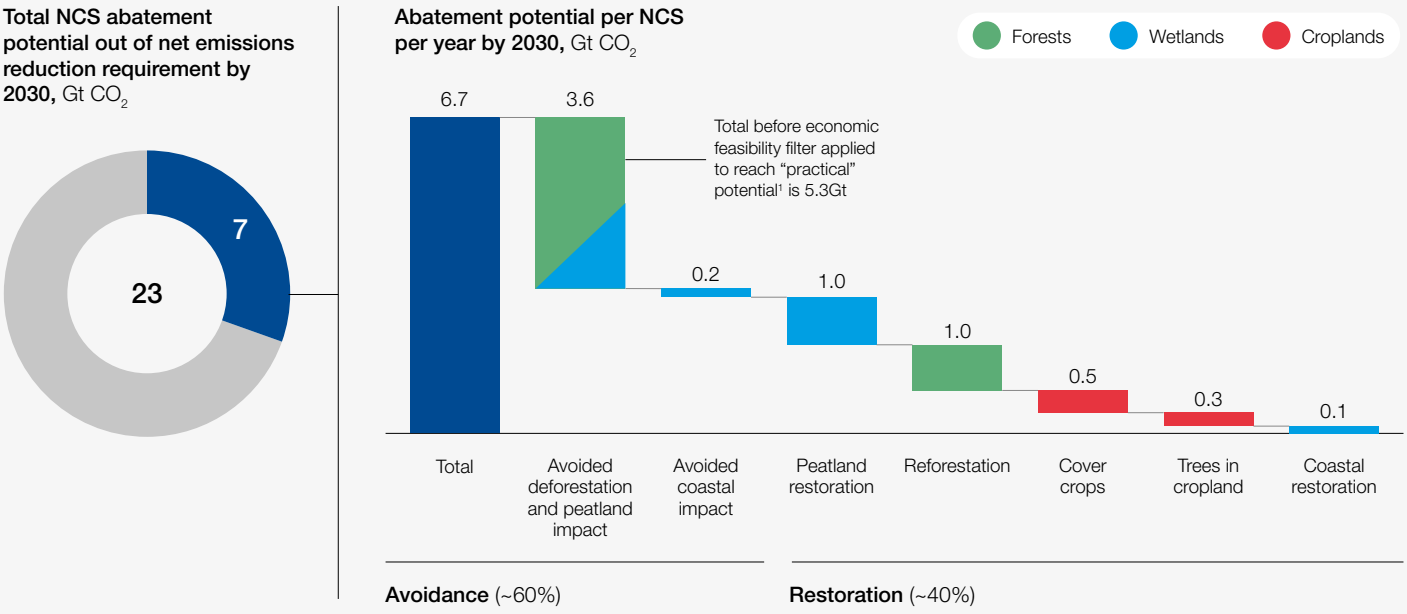
The research undertaken for this paper finds a total abatement potential of 10.2Gt CO_2 per year by 2030 from eight high-potential NCS. This total is then filtered down to a "practical" potential of close to 7Gt CO_2. The practical potential is a portion of the total NCS abatement potential in recognition of the fact that it becomes progressively more difficult to secure carbon credits as the total potential of each source is approached.[17] It uses an economic filter (agricultural rent) to identify and remove "low-feasibility" lands (see "About the research"). Again, this is not to advise against or discredit the pursuit of the full potential, but rather to acknowledge that some portions will be more difficult to unlock than others. The bulk of this total comprises four types of NCS: avoided deforestation and peatland impact, peatland restoration, reforestation and cover crops (Figure 3). Our estimate is conservative compared to existing literature that has produced estimates above 10Gt CO_2 per year.[18] This is due to two factors. First, the adoption of stringent feasibility filters and updated datasets. For example, the analysis uses a biophysical filter to account for water stress and an economic feasibility filter that removes high-cost land area (agricultural rent of over $45 per hectare per year). Second, the focus on highest-potential NCS, which means that solutions such as grassland conservation are excluded. While the bulk of NCS potential comprises the four types already metioned, a broad array of solutions will need to be adopted since each brings unique physical criteria (such as co-benefits), operational differentiation (such as property rights) and geographical requirements.

BOX 2 | **About the research**

Overall, we find the "practical" abatement potential of NCS to be 6.7Gt CO_2 per year by 2030. The practical potential is a portion of the total NCS abatement potential (10.2Gt CO_2 per year by 2030), recognizing that it becomes progressively more difficult to secure carbon credits as the total potential of each source is approached. It filters out low-feasibility lands, which are more likely to be accessed by mechanisms other than voluntary carbon markets, such as philanthropic or governmental grants. For example, the practical potential of reforestation is sized at 1.0Gt CO_2 per year by 2030, which excludes and additional 1.1Gt CO_2 per year that is low feasibility according to our filter. There are many economic, political and social lenses that can be used to determine feasibility. In reality, these lenses would not draw a neat boundary between lands that are practical or not; however, this analysis classifies low-feasibility lands, assessing their "agricultural rent" as an economic barrier and proxy for feasibility. Agricultural rent is defined as the economic return from agricultural land, which represents a key decision factor in land-use choices relevant to NCS and is accounted for in the majority of academic literature on NCS costs. We used statistical thresholds of $10 and $45 per hectare per year to differentiate between high and medium, and medium and low feasibility, corresponding to the 33rd and 66th percentiles of the ecoregion median values.

For each NCS, a different methodology was used based on the availability of data. In the case of reforestation, for example, we identified total biophysical potential and then adjusted down to correct for: (1) biomes (biological communities) where NCS could have a negative climatic effect, such as reforestation in non-forest biomes and boreal forests due to absorbing heat and accelerating warming (the albedo effect); (2) water stress; (3) human footprint (we excluded cropland and urban areas, as well as areas where urban expansion is projected); and (4) land with high economic returns from other uses. For avoided deforestation and peatland impact, for example, we replicated analysis used in Busch et al., 2019,[19] which estimates the geospatially distributed potential for avoiding deforestation to 2050 based on a forecast of the rate of gross deforestation, on agricultural revenue, and on scenarios for carbon price incentives. See methodological report for further detail.

FIGURE 3 | **NCS could deliver up to one-third of net emission reductions required by 2030**



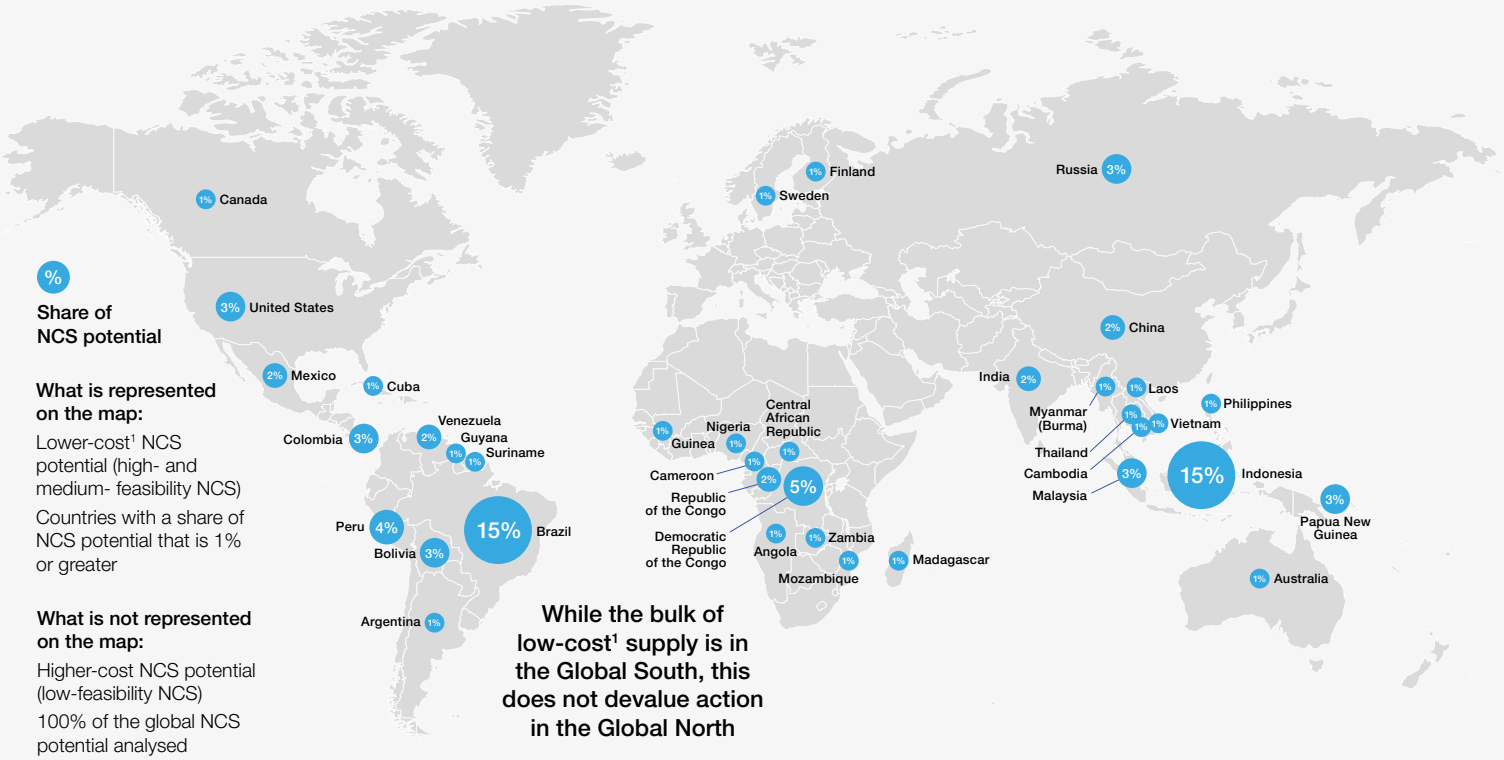
Notes: [1] The "practical" potential is a portion of the total NCS abatement potential in recognition of the fact that it becomes progressively more difficult to secure carbon credits as the total potential of each source is approached. It filters out low-feasibility lands, which are more likely to be accessed by mechanisms other than voluntary carbon markets, such as philanthropic or governmental grants. The practical potential sized here is 6.7Gt CO_2 per year by 2030, which excludes 3.5Gt CO_2 that is low feasibility according to our filter. The total potential is therefore 10.2Gt CO_2. There are many economic, political and social lenses that can be used to determine feasibility. In reality, these lenses would not draw a neat boundary between lands that are "practical" or not for the voluntary carbon market; however, this analysis classifies low-feasibility lands, assessing their agricultural rent as an economic barrier and proxy for feasibility.

Source: McKinsey Nature Analytics

These solutions are distributed unevenly around the globe and at different costs (Figures 4a and 4b). Costs are mainly driven by underlying land (opportunity) costs, so areas where there are competing land uses tend to involve higher costs. Overall, however, NCS involve significantly lower costs than other forms of carbon dioxide abatement, highlighting the benefits of NCS as it is available to be deployed immediately without technological breakthroughs. The benefits to climate mitigation of early action are well understood.[20]

FIGURE 4a

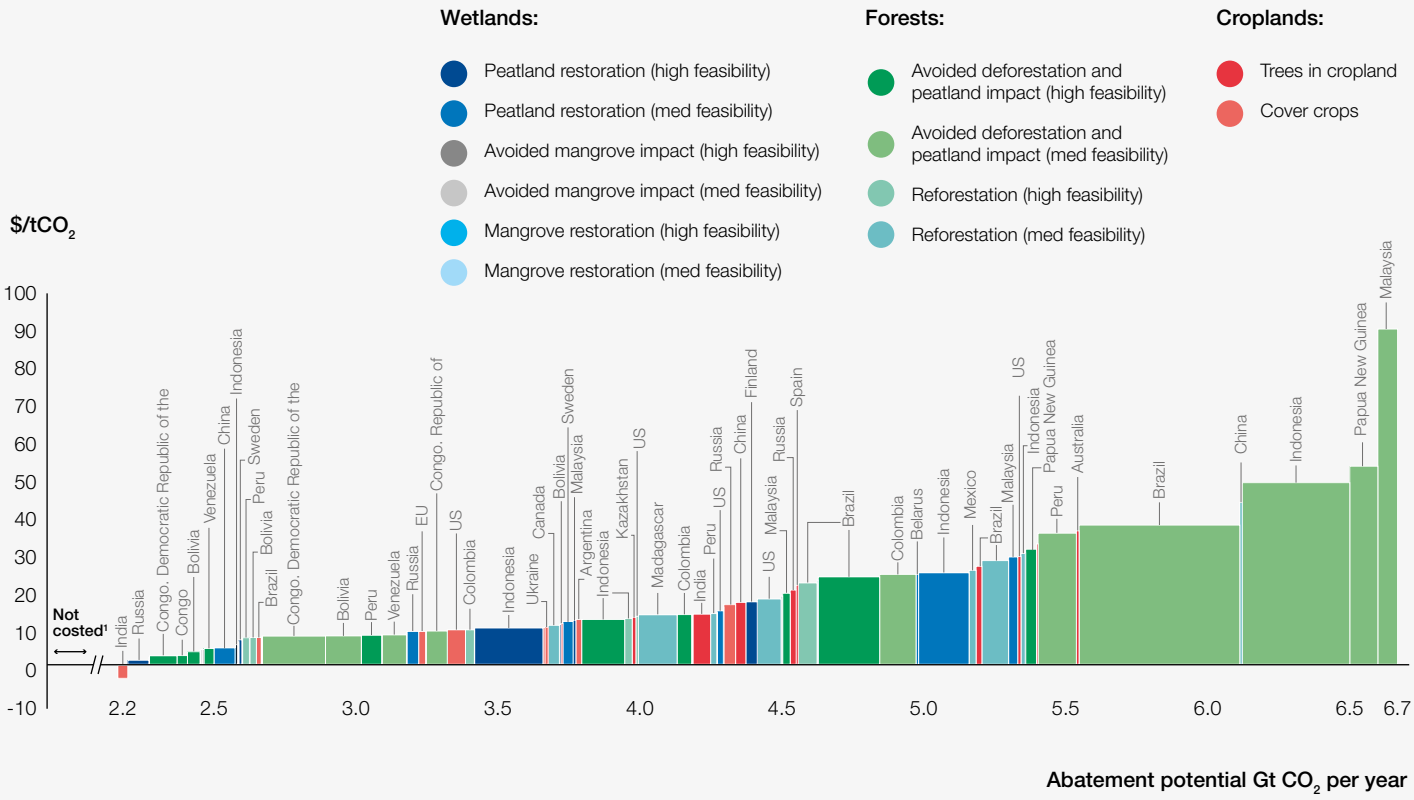
Low-cost NCS potential is spread across the globe, with the bulk of volume in the Global South



Notes: [1] Low cost refers to the "practical" potential of NCS (see "About the research" box). "Practical" potential is a portion of the total NCS abatement potential in recognition of the fact that it becomes progressively more difficult to secure carbon credits as the total potential of each source is approached. It uses an economic filter (agricultural rent) to identify and remove "low-feasibility" lands. We refer to it primarily as "practical" instead of "low cost" to reflect that it is just one of a number of barriers to mobilizing NCS (e.g. social, political, etc.). However, it is most appropriate in the context of a map to highlight that it is also a reflection of the low costs that help to explain the bulk of volume in the Global South as represented here.

Source: McKinsey Nature Analytics

FIGURE 4b | **The majority of NCS can be delivered at low cost**



Notes: [1] 2.2Gt total: avoided deforestation 0.95Gt; peatland restoration 0.21Gt; reforestation 0.36Gt; avoided coastal impact and restoration 0.30Gt; cover crops 0.22Gt; trees in cropland 0.11Gt.

Source: McKinsey Nature Analytics

BOX 3 | **Detail of NCS credit cost curve**

Country-level cost curves were built for each NCS, focusing on high-potential countries (top 10 countries by potential for each NCS). In total, we created granular cost curves for approximately 70% of the practical NCS abatement potential, leaving 2.2Gt CO_2 not costed (represented on the left side of Figure 4b). NCS project costs were determined via expert interviews and literature reviews, and discounted using a 10% discount rate on 30-year projects (in line with the academic literature) to account for the different time horizons of expenses.

Four types of cost are considered in our assessment: land costs, initial project costs, recurring project costs and carbon credit monetization costs.

All NCS follow the same cost analysis except for cover crops, which differs in that we calculate net rather than gross costs for these. This is to reflect the direct economic benefits outside of carbon markets that accrue to land operators using cover crops, including reduced input costs such as fertilizer, and in some cases increased revenue from higher crop yields.

Results

As Figure 4b shows, NCS are typically low-cost sources of carbon abatement. In most cases, costs are between $10 and $40 per ton of CO_2 (tCO_2) with variations between geographies and project types. This is significantly lower than technology-based removal.

Within NCS, avoided deforestation has the greatest abatement potential but also some of the highest costs, such as approximately $30 per tCO_2 in Brazil and Indonesia. What drives high costs for avoided deforestation is land efficiency. As a rule of thumb, protecting 100ha in an area where there is a 1% annual deforestation rate will yield credits for avoiding the emissions from the deforestation of 1ha per year. In practice, land costs can be funded by other parties such as national governments or NGOs. In these circumstances, avoided deforestation is lower cost than reforestation due to lower maintenance costs. Our cost estimates were calculated based on typical deforestation rates per country. While avoided deforestation may incur higher costs in places, it is worth noting that it also carries the potential to bring about more substantial co-benefits than other pathways.

The co-benefits of natural climate solutions

“What makes investments in nature especially attractive if done well is the enormous and varied array of ‘co-benefits’ that can arise alongside directly addressing the biodiversity and climate crises – benefits that accrue to nature and to communities.

To recap, the analysis suggests that NCS have the potential to limit the pace of climate change significantly, delivering up to one-third of net emission reductions required by 2030.

But what makes investments in nature especially attractive if done well is the enormous and varied array of “co-benefits” that can arise alongside directly addressing the biodiversity and climate crises – benefits that accrue to nature and to communities. These include heightened resilience in the face of the negative effects of climate change, and more sustainable development opportunities for local communities. Coastal wetlands, for example, can absorb incoming wave energy, reduce flood damage and provide protection from storms; improving soil health increases the resilience of cropland; and fire management can mitigate the risk of catastrophic wildfires, all of which can help protect and secure the income and assets of rural communities.[21]

Analysis carried out by the Woodwell Climate Research Center for this report shows that the three largest NCS by potential have high environmental co-benefits, including sequestering carbon, biodiversity, soil health and water quality (Figure 5; see methodological report for detailed results table). Therefore, scaling-up NCS, and addressing the causes of the historic underinvestment in nature solutions, will help to close the biodiversity finance gap, recently estimated at between $722 billion and $967 billion per year over the next 10 years.[22] In addition, a scale-up of NCS could create opportunities for more resilient rural development models in forest frontier regions and in the Global South. It could also provide important innovation and learning opportunities for the transition to a nature-positive food and land-use sector, a critical task for world governments in the next decade.

Beyond the environmental co-benefits assessed in Figure 5, NCS projects can create broader benefits for local livelihoods, health and education. As the bulk of low-cost NCS potential is in the Global South, NCS projects can generate flows of private capital to these countries. This creates further co-benefits (even those not related to nature or climate such as reduced inequalities), many of which are captured in the 17 UN Sustainable Development Goals (SDGs) that represent objectives on the path to a more sustainable future.

Resource-rich forest countries have drawn attention to this in the past. In the 2019 Krutu of Paramaribo Declaration, representatives of high forest cover and low deforestation (HFLD) countries in the Global South called attention to the value of preserving standing forests to achieve the SDGs and underscored the need to scale up international climate financing to this end.[23] Achieving the SDGs will require a multitude of financial instruments, particularly to guide a sustainable COVID-19 recovery in the coming years. While insufficient by themselves, NCS credits can offer one vehicle for contributing to SDGs such as the creation of decent work, the eradication of poverty and the preservation of life on land and under water.

BOX 4

Preserving and restoring forests can bring great benefits

Preserving and restoring forests is a top priority in terms of increasing carbon sequestration and providing the co-benefits of biodiversity conservation and protection of soils and waters.

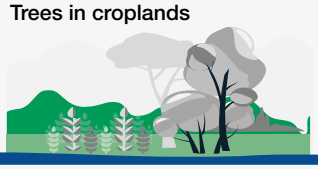
Forests store carbon above ground in trunks and branches. Leaf litter and tree roots contribute organic matter to soils, stabilize soils against erosion, and improve the quality of downstream surface waters. Forests with fast-growing trees can sequester carbon quickly, and large-statured, high-biomass forests can ultimately store large total amounts of carbon.

The largest areas of fast-growing and high-biomass forests occur in the Amazon basin of South America, the Congo region of Central Africa, and the Indonesian New Guinean territories of South-East Asia. Smaller areas of high-biomass forest occur in western North America, south-eastern Australia, western Africa, and on the south-central coast of South America. While large and important areas of temperate and boreal forests occur across North America, Europe and Asia, these forests in general have lower potential maximum biomass and in most cases slower growth rates because they experience shorter growing seasons. Large areas of less dense forests and woodlands occur in drier regions, but growth rates and maximum biomass of these areas are much reduced by low rainfall.

Many regions of tropical forests contain much higher levels of biodiversity than temperate or boreal forests. Conservation or reforestation of tropical forests therefore provides higher benefits for both carbon sequestration and biodiversity conservation than conservation or reforestation of equivalent areas of temperate or boreal forests. Conservation or reforestation of tropical forests in geographical hotspots that have exceptionally high species diversity, or in places where most of the original forest cover has been lost, will have even higher biodiversity co-benefits.
All forests provide important co-benefits by protecting soils, reducing erosion and absorbing nutrients and other sources of water pollution. Conservation of tropical forests will also have high co-benefits for water protection, particularly in areas of very high rainfall and steep terrain.

Because most of the carbon protected by tropical forest conservation or sequestered by tropical reforestation is stored above ground, this carbon can be tracked from satellite imagery that quantifies the area, height and density of forests.

FIGURE 5 | **The environmental co-benefits of NCS[1]**

	Avoided deforestation	Reforestation	Avoided peatland impact	Peatland restoration
Avoid/ sequester carbon	● High benefits of avoided carbon emissions and continued carbon sequestration, especially in humid tropical forests, high-biomass temperate forests and large temperate forested regions.	● High benefits of sequestration. Potential highest in humid tropical and temperate regions with high rates of tree growth and biomass. Success will be more predictable in in temperate regions where availability of native trees for replanting is high and replanting after harvest is an established practice.	● High benefits of avoided carbon emissions and continued carbon sequestration in trees and soil, especially in tropical peat forests and in temperate and boreal peatland forests with high soil carbon that would be released upon forest loss and soil drainage.	◐ Medium benefits from carbon sequestration due to variability. Potential will depend on how much methane is emitted, which may offset potential gains. This is not well known and will also depend on type and local setting.
Biodiversity	● High and immediate benefits of maintaining intact and connected forests. Benefits very high in humid and semi-arid tropical forests with high biodiversity, and in regions that have high numbers of endemic species and/or high proportions of forest loss.	● High ultimate potential to protect biodiversity rapidly in replanted secondary forests, but benefits take decades to be realized as forests mature. Benefits highest by expanding or reconnecting remaining forests, in regions that have high numbers of endemic species, and those that experience high proportions of forest loss.	● High benefits across all biomes. Particularly high biodiversity benefits in tropical peat forests. High biodiversity benefits in connected peatland lowland forests. Lower biodiversity benefits in higher-latitude temperate and boreal peatlands that have lower overall plant and animal biodiversity.	● High benefits because of the disproportionately high value of peatland habitats. These values occur across biomes.
Soil health	● High benefits of erosion prevention by physical buffering of high stream flows and prevention of flash floods and maintenance of soil infiltration by vegetation and soil fauna under forest. Benefits likely to increase in the future with a predicted greater number and magnitude of extreme precipitation events.	◐ Medium benefits of reduced soil compaction, increased water infiltration and accelerated cycling of soil nutrients that occur with reforestation and associated return of inputs of leaf litter. Associated benefit of reduced soil loss to erosion follows from reduced compaction and greater infiltration.	● High benefits from avoidance of losses of soil organic matter that accompany soil drainage. Benefit of avoidance of acid conditions that follow drainage of some peat wetland soils.	◐ Medium benefits of returning soils to wetland conditions that have high organic matter input and permanent or periodic low oxygen. While these conditions are not desired in agricultural soils, they facilitate carbon storage and the co-benefit of nutrient removal in peatlands.
Water quality	● High benefits of nutrient uptake and retention of nitrogen and phosphorus by forest vegetation that prevents nutrient losses to watersheds.	● High benefits of reductions in erosion and soil loss caused by lower compaction, greater infiltration and more buffered peaks of stream flows in replanted forests.	● High benefits of avoidance of large nutrient losses that accompany forest removal. In addition, avoidance of acid drainage water or highnutrient releases that accompany drainage of some peat soils.	● High benefits especially in cropland regions and in locations that are downstream of fertilized croplands or in locations that have contact with nutrient-enriched surface or ground waters.
	Cover crops	**Trees in croplands**	**Avoided coastal impact**	**Coastal restoration**
				
Avoid/ sequester carbon	◐ Medium benefits to store soil carbon. Potential is limited by short duration of cover crops in most planting systems, potential conflicts with crop production, and benefits that are easily reversed if cover cropping is discontinued.	◐ Medium potential to increase carbon stored in trees within existing croplands. Potential is generally less than one-third of the potential of avoided deforestation or reforestation.	● High carbon storage benefits both above and below ground for mangroves and below ground in coastal marshes. Maintenance of mangroves and marshes promote resilience in the face of sea level rise.	
Biodiversity	○ Low benefits, especially compared to reforestation, because land remains cropland with relatively low biodiversity. Some benefits for pollinators for some cover crops, but timing during the growing season may restrict benefits.	◐ Medium benefits from addition of structural complexity to croplands. Benefits will occur across all biomes but will be greater in tropical regions with high biodiversity and in regions that have low proportions of remaining forest area.	● High benefits from improved habitats for fisheries and aquatic life.	◐ Medium benefits as restoring mangroves and marshes produces high benefits in the long term, but these benefits take many years to occur. Uncertainties for successful mangrove and marsh restoration are higher than for avoided mangrove loss because of limited experiences in restoration across the range of mangrove species and in conditions where mangroves and marshes occur.
Soil health	◐ Medium benefits of increased organic matter inputs, increased water infiltration, increased water-holding capacity and benefits to nutrient supply provided by decay of cover crop-derived soil organic matter.	○ Low benefits for soil health, but with some potential for reduced erosion. Benefits will increase with the number and coverage of trees and will vary by location.	● High benefits as a result of continued sediment capture and maintenance of wetland and peat soils by mangroves and marshes.	
Water quality	◐ Medium potential to reduce nutrient losses by maintaining plant cover for a longer time during the year. The deep rooting of many cover crops helps prevent nutrient losses. The short duration of cover crops limits total nutrient capture potential.	○ Low benefits for water quality. Benefits will be higher if trees are planted within heavily fertilized croplands and if they are concentrated along streams or watercourses where they could intercept nutrient run-off.	● High benefits of nutrient and sediment retention by mangroves and marshes.	

● High ◐ Medium ○ Low

Notes: [1] The types of NCS represented here are those included in the detailed sizing and cost analysis; research carried out for this report also analyses the co-benefits of additional NCS such as biochar, fire management, grazing management and natural forest management. See the methodological report for more details.

Source: Woodwell Climate Research Center

The concept of co-benefits is not new. The Climate, Community and Biodiversity (CCB) Standards identifies projects that produce these wider benefits, and social credits are traded and command premiums over other credits. But, for now, volumes remain small and prices low. This reflects one of the major challenges facing NCS: the variability in nature benefits of NCS creates a lack of transparency, which in turn stymies demand.

Put simply, it is difficult to accurately determine the co-benefits of any project. First, the specific nature of each biome varies, as do the indirect effects and their local value. Second, not all nature benefits have global reach. For example, while carbon sequestration can benefit citizens globally, improved water quality and availability provide local benefits.

Addressing this lack of clarity must be a high priority in the future. Improvements could lead to benefits in terms of the price and value of NCS, especially if they are to attract the levels of investment required to take full advantage of their benefits. NCS currently face something of a chicken-or-egg problem: Demand is constrained by uncertainty in supply – lack of clarity on co-benefits, concerns about environmental integrity, and the absence of visible supply – and supply is limited by the absence of predictable demand (which in turn would attract the requisite financing).

Below: Unsplash

3 The way forward: unlocking the potential of natural climate solutions

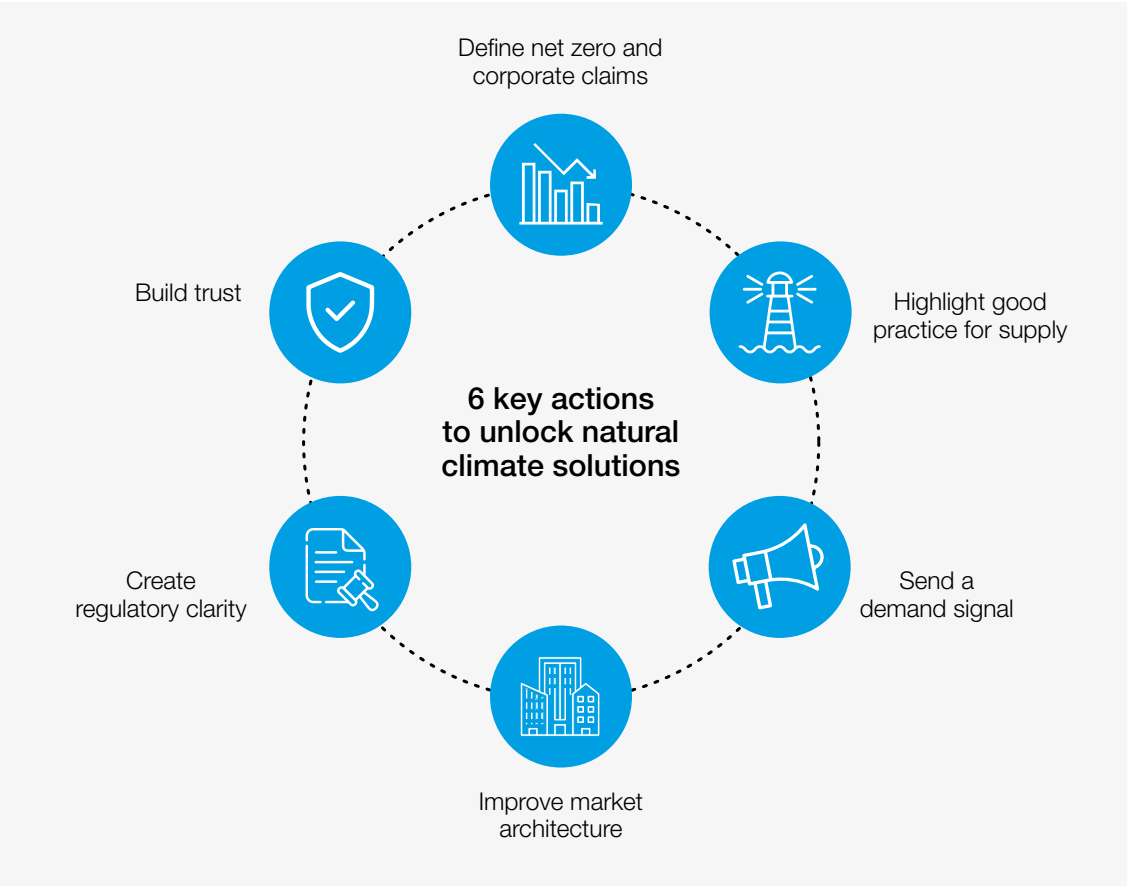
While there is tremendous potential for NCS as part of a net-zero economy, a number of technical and conceptual hurdles, as well as various institutional failures and poor experiences of past schemes, have created a lack of confidence among many stakeholders in terms of how effective NCS can be. This has prevented NCS markets from achieving scale.

In the past, carbon markets in general and forestry credits in particular have suffered from low price levels, an oversupply of credits as a result of inflated baselines, insufficient demand and liquidity in the market. The technical hurdles remaining today can be overcome with improved monitoring technology and market architecture. Perhaps most importantly, the conceptual differences that hamper today's market development require stronger collaboration, multistakeholder dialogues and dedicated efforts to build effective institutions and – fundamentally – trust among both public and private actors, but also between the resource-rich host countries of NCS projects and potential buyers of such credits.

Carbon markets present one opportunity to increase financing for natural climate solutions and help NCS reach the scale required to meet net-zero targets. Other financing vehicles have gained increasing attention in recent months, including debt-for-nature swaps, green bonds and loan programmes, blended finance instruments to de-risk investments and nature-linked insurance mechanisms to increase resilience. While not the focus of this report, it is recommended that further work should be undertaken to see how these other kinds of vehicles, together with carbon markets, can provide a portfolio of NCS financing solutions.

Rather, and building on recent developments, this report lays out some key actions to overcome existing bottlenecks in NCS carbon markets and create certainty for buyers, suppliers and regulators.

FIGURE 6 **Six key actions needed to unlock natural climate solutions**


Define net zero and corporate claims
Highlight good practice for supply
Send a demand signal
Improve market architecture
Create regulatory clarity
Build trust
6 key actions to unlock natural climate solutions

3.1 Key Action #1: Define net zero and corporate claims

Net zero was defined by the Intergovernmental Panel on Climate Change (IPCC) at the global level. However, there is no universal consensus on how to translate global reduction targets into company-specific claims. Several initiatives are working towards sector-specific abatement pathways to quantify reduction milestones, as well as the level of residual emissions to be expected in 2050 in a net-zero world.

In parallel, different climate mitigation pathways model different roles for negative emissions in a net-zero pathway, depending on factors such as cost and technology.[24] What is certain is that a share of residual, unavoidable emissions will need to be sequestered both in the run-up to 2050 and into the second half of the 21st century. As stated above, the analysis underpinning this report suggests that NCS have the potential to deliver close to 7Gt CO_2 per year by 2030 if significant action is taken.

Today, companies can claim carbon neutrality, climate neutrality and climate-positive and carbon-negative performance, as well as zero-emission products based on different labels and standards. To truly scale demand, corporates need clarity on the type of claims they can expect to make based on a combination of reduction and compensation measures. This requires alignment of net-zero certification for companies under one commonly accepted international standards body, underpinned by scientifically reviewed sectoral trajectories. While the development of such methodologies will take time, it is clear that this decade presents a narrowing window of opportunity to reduce emissions and remain within safe carbon budgets.

The use of NCS credits (or any offsetting credits) by companies without a net-zero target is heavily disputed today. However, there is emerging consensus that NCS have a role to play in reducing emissions from land use, compensating for historical emissions, balancing unavoidable residual emissions from harder-to-abate sectors and as an interim solution for companies on a net-zero transition journey.

One possible approach involves a company using carbon credits to compensate for its entire footprint today, as an interim measure while on a transition pathway towards net zero. Truly unavoidable emissions after full decarbonization could be compensated for only with removal credits, and companies taking this path could claim net zero.

Opting for a full compensation strategy to reach climate neutrality in this way offers the opportunity to remove carbon from the atmosphere earlier, but critics fear it might divert funds from critical (and often underfunded) emission reduction measures. From a market perspective, the added benefit of full compensation would be to substantially drive up demand – and given the time lag in delivering quality supply, the earlier this signal is provided, the more chance there will be to achieve the full potential of NCS and provide a critical source of funding for forests and other ecosystems.

There is an urgent need to quantify and clarify the role of NCS for sector-specific net-zero strategies. Such research needs to be scientifically grounded and universally accepted, and requires a concerted effort to build consensus on the integrity and validity of both the pathway itself and the institutions presenting it.

> To truly scale demand, corporates need clarity on the type of claims they can expect to make based on a combination of reduction and compensation measures.

3.2 Key Action #2: Highlight good practice for supply

In recent years, concerns about the validity of NCS credits have been raised repeatedly in the public discourse and expert outlets. Most notably, there are questions with regard to the additionality of NCS projects, meaning whether the emission reduction would have occurred without a carbon-crediting programme, such as through conservation measures or alternative competitive sources of revenue. Another prevailing concern is whether a project developer can guarantee the permanence of carbon storage in the event of future deforestation, wildfires, floods or other disasters. Critics often cite leakage, where harmful activities such as illegal logging simply relocate to an area outside the purview of the project. In addition, projects can fail to account for or support the needs of local communities and stakeholders.

With more than 20 years of international collaboration to generate and trade NCS credits, great strides have been made in addressing these issues. Buffer pools account for the risk of reversal in cases such as illegal deforestation and wildfire. Monitoring and verification technology is assisted by leaps in machine learning and earth observation capabilities that were unimaginable even 10 years ago. Baseline methodologies have become more stringent and we now have accounting systems to integrate reduction from standalone projects into national reference levels to avoid flooding the market.

In order to expand quality supply, participants in these ecosystems will need to highlight good practices that have successfully used methodological and technological advances to mitigate environmental and social risks, setting a course for others to follow. This could be done by elevating large-scale lighthouse projects to ensure the amplification and acceleration of promising practices, and adoption at scale. There is also a need to highlight good practice and progress among local and regional administrations in implementing sustainable land-use policies in line with climate targets. Increasingly, credits from the voluntary market are being accepted in compliance schemes, project developments are being administered on public lands, and projects are being integrated into jurisdictional programmes. A key objective for the broader community is to empower jurisdictions to begin to integrate at scale and unlock the full climate, environmental and social benefits of NCS. This will require partnership with forest country governments, local leaders and on-the-ground implementation agencies. Critically, any such efforts to highlight existing best practices must be in step with HFLD developing countries, and concurrently ensure they recognize and address the needs of local stakeholders (see “Case study: the Katingan Mentaya Project”).

BOX 5 Technical hurdles for credit originators

Beyond the critical challenge of elevating good practice to address persistent integrity and credibility issues, there are a number of technical hurdles facing the scale-up of NCS supply:

- Financing: carbon credits are pay-for-performance, meaning that suppliers have to operate projects for years before being able to verify any emission reductions achieved and collect revenue. As a result, and exacerbating the situation, there is a lack of up-front project finance.
- Pricing: low prices in carbon markets in recent years have made it difficult to develop viable business models. Many project developers have resorted to stacking revenue streams such as ecotourism and sustainable agricultural and timber production to supplement their income.
- Land rights: NCS projects are often implemented in remote locations with unclear tenant rights or a lack of enforceability.
- Verification cost: the process of verifying NCS credits can still be slow, expensive and contested. This is particularly true in the case of soil carbon, which has not yet benefited to the same extent from improved earth observation capabilities.
- Biophysical capacity: land use for NCS is constrained by critical activities such as food production, human infrastructure and fuel production. In addition, increasing carbon sequestration in forestry relies on nursery capacity, which in some US locations has been reported to be at its limits.

A number of these constraints can be addressed through the recommendations below, such as building a demand signal, increasing policy certainty and improving market infrastructure. In addition, there is a need for continued innovation across finance and technology to make it easier to mobilize NCS.

BOX 6 | **Case study: the Katingan Mentaya Project**

In 2014, Dharsono Hartono spent countless hours meeting with more than 500 Indonesian farmers and pitching a simple, but bold idea: that they cease their environmentally destructive farming practices and partner with his new company, the Katingan Mentaya Project, to implement sustainable farming – and increase their profits. Slash-and-burn and chemical saturation practices were deeply ingrained, however, as was a cultural scepticism of private enterprises. Only two farmers agreed to partner with Dharsono and predators destroyed one farmer's entire crop later that year. Still, despite the challenging start, the two farmers were energized by the outstanding increase in the fertility of their soil. Word spread throughout their community of this success and more farmers began to partner with Dharsono. Since beginning in 2007, the Katingan Mentaya Project has grown into the world's largest forest-based avoided-emissions project, having prevented the release of greenhouse gases equivalent to more than 37Mt CO_2 in the almost 150,000 hectares of forest the project protects. And today, the project is profitable. Dharsono's work proves it is possible to extract financial value by preserving natural resources in challenging operating environments.

Dharsono attributes the project's success to three factors:

– **A spirit of transparency and partnership with farmers.** He says entrepreneurs seeking to implement similar sustainable farming practices must treat farming communities as equal partners. The project was based on gaining a deep understanding of the communities concerned and taking time to convince farmers to join. As communities saw the successes of those who partnered with it, they became open to following suit.

– **Focusing on the most valuable projects first.** The Katingan Mentaya Project primarily focuses on peatland forests, which store about 10 times more carbon dioxide than non-peatland forests, thus maximizing the impact on the environment, ensuring the project is profitable, and enabling it to attract investors.

– **Favourable public policy and regulations.** Policy is the Katingan Mentaya Project's greatest risk, as its core product of carbon credits relies on the government allowing it to manage public land to generate these credits. The volume of credits it can generate is dictated by the independently verified baseline, which takes into account the rate of deforestation in the region. By treating the community as partners, Katingan Mentaya positively influenced government attitudes towards a new model of forest management and helped create a favourable regulatory framework.

The Katingan Mentaya Project has developed an effective template for forest management in Indonesia. Although the project took 13 years from inception to its current state, Dharsono believes that it would now be possible to create a profitable project in just three to four years, given the increased demand from maturing carbon markets and a favourable regulatory environment.

3.3 Key Action #3: Send a demand signal

Carbon markets in general and NCS markets in particular have experienced a number of years of oversupply and low prices, resulting from inflated baselines and integrity issues in the early days of emissions trading. Creating a demand signal could solidify pricing across carbon markets and build confidence in new and improved methodologies. Today, a demand signal would unlock the supply pipelines needed to meet global net-zero announcements. This would require high emitters coming together to prioritize NCS credits with high co-benefits over other types of credits. The confidence in future prices this would bring is critical to unlocking the supply of high integrity co-benefit NCS projects. There are several such efforts under way, including the Green Gigaton Challenge led by UNEP and focused on jurisdictional REDD+ credits, as well as the NCS Alliance hosted by the World Economic Forum and the World Business Council for Sustainable Development, which is looking beyond tropical deforestation.[25]

Ultimately, the supply of NCS will be limited by biophysical capacity. Increasing the demand for these credits will slowly deplete the available marketable natural supply, leading to pricing that more accurately reflects the social cost of carbon. High co-benefit solutions such as avoided deforestation will become more attractive under higher-price scenarios, thereby yielding better overall outcomes. Buyers and suppliers will both benefit from a more complete understanding of how pricing will evolve, supporting both development and forward commitments, as well as purchases. In addition, a demand signal serves to build confidence in both policy-makers and credit originators to increase the project pipeline and allow NCS credits into compliance schemes.

For corporate purchasers to opt into such a demand signal, there is a need to scale credible, high-quality supply as described in the previous section. In practical terms, this means a willingness to pay a premium for co-benefits rather than lowest-cost carbon credits. A key to enabling this, cited by demand-side actors, has been to improve accessible and comparable data on NCS credits.

BOX 7 Case study: the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme (CORSIA)

One way to deliver a clear demand signal is through sector-wide collaborations/consortia such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). In 2019, the Environmental Defense Fund (EDF) estimated that CORSIA could unlock additional demand of 2.5Gt CO_2e per year from the aviation sector. In the short to medium term, demand is expected to be hampered by the effects of the COVID-19 crisis, but several updated forecasts have since endeavoured to plot a possible post-recovery pathway.[26]

Some of the key considerations relating to the potential scale of such schemes have been the integration of existing voluntary market credits and the emission years to be covered. In 2020, CORSIA ruled to include credit vintages spanning the years 2016–2020 and the technical advisory body is assessing eligible crediting programmes on an ongoing basis.

BOX 8 Valuing co-benefits

NCS are an elegant way for companies and buyers to address both nature and climate needs in tandem. But the co-benefits they bring are currently undervalued. Therefore, there is a need to establish mechanisms to value the co-benefits, disseminate awareness of their value, and promote the purchase of these higher-quality – perhaps higher-priced – carbon credits. To do so, standards must be harmonized. For example, the TSVCM recommends alignment on a set of core carbon principles, supported by governance bodies to curate, host and enforce them. Standards and/or ratings agencies have an important role to play here too: Engaging established agencies to assess the benefits to nature will accelerate efforts to develop a consistent system of market pricing.

In order for buyers to recognize the full value of NCS, an agreed methodology needs to be established to define the value of co-benefits. The Woodwell analysis highlighted earlier in this report provides the beginnings of such a framework, but further work is required to set out exactly how co-benefits should be treated (and priced). This will require alignment between groups that have not hitherto been accustomed to working together, such as advocates for action on climate change on the one hand and those pressing for measures to combat nature loss on the other.

3.4 Key Action #4: Improve market architecture

Beyond the key issues of ensuring supply and demand side integrity, the lack of appropriate market infrastructure is restricting the trade of NCS credits. Unless these structural barriers are addressed, NCS cannot reach their full potential to help solve the net-zero equation. In January 2021, the TSVCM released recommendations to increase the depth, liquidity and efficiency of voluntary carbon markets. The following recommendations focus on how this could help unlock more efficient markets for NCS specifically.

Create a unified carbon unit

In the quest for better market infrastructure, creating clarity on standards must be the most important priority. The TSVCM proposed creating carbon reference contracts, based on a set of core carbon principles (CCPs) to ensure the quality of underlying credits. While this recommendation, like so many, applies to all types of carbon credits, it is particularly relevant here: NCS credits vary by underlying credit source, region and co-benefit. The CCPs take this into account by creating additional attributes based on these characteristics that would allow for the adequate pricing of co-benefits while also providing a unified and comparable unit for trading. Buyers have the opportunity to select credits based on their preferences (e.g. blue carbon credits or jurisdictional REDD+ credits only), while suppliers benefit from greater transparency and certainty.

Market data

There is little publicly available and comparable data on carbon credits in general and NCS credits in particular. Credit transfers and retirements are logged in registries that are run by individual standards or jurisdictions, making data discovery a complex endeavour. This acts as a deterrent to buyers, artificially limiting demand. This challenge is exacerbated by the proliferation of different standards, and lack of price transparency by over-the-counter (OTC) brokers. The lack of transparent pricing information makes negotiations challenging for buyers.

The relative abundance of NCS credit types and standards exacerbates the lack of reliable pricing and quality data. The TSVCM recommendation for exchanges to offer spot and futures contracts will significantly increase availability of price data. Furthermore, the TSVCM encourages registries and brokers to publish information on the retirement of credits including the relevant buyers.

Lowering the barrier to entry for new market participants could be as easy as building a publicly available meta-registry that aggregates information on available credits across different programmes, standards or even jurisdictions. This would make quality, risk and pricing data easily accessible for stakeholder groups across project originators, auditors and potential buyers.

Exchanges

The TSVCM recommends building or leveraging existing high-volume trade infrastructure. Improving the availability of price, risk and performance data would accelerate structured finance, enhancing the bankability of the underlying carbon projects, which has been an often-cited challenge for NCS developers.

The idea of a centralized carbon exchange is not new. While the Chicago Climate Exchange (CCX) folded in 2010, its development offers valuable lessons. Today, there is no longer a central carbon exchange for buyers to purchase credits at known prices. This has produced friction in the market, where suppliers are unable to react to demand signals and buyers incorrectly assume a lack of supply. Furthermore, the absence of an exchange has created a barrier for new market entrants, who are looking for a more standardized way to trade. While this applies to all types of carbon credits, it is likely to disproportionately affect NCS credits, which are the second-largest source in voluntary carbon markets (VCM) due to their unpriced co-benefits and lack of market liquidity.

Improving liquidity and financing

> There is a clear need for alternative financing models, whether venture philanthropy, impact investing, blended finance or other (innovative) forms that can provide for the risk and time horizons.

Innovative financing mechanisms are needed to aggregate supply and bridge the time gap before NCS projects generate cash. So are subsidy and grant schemes, to help land-use sectors change agricultural and forestry practices, and to aid blended finance instruments in de-risking early-stage investments.

More mature solutions that have market-rate returns in place should continue to attract private, return-seeking capital. However, there is a clear need for alternative financing models, whether venture philanthropy, impact investing, blended finance or other (innovative) forms that can provide for the risk and time horizons. In addition, it is important to support developers and intermediaries, to build expertise and effectively aggregate and securitize projects so that they can be marketable.

As well as addressing the cash-flow gap, innovative financing will enable higher-risk but higher-impact projects to advance even if the full benefits are not (yet) priced in or the business environment is perceived as riskier (such as avoided deforestation in the Democratic Republic of the Congo). It can also help radically expand smaller projects (lighthouse cases) beyond a scale that return-seeking capital may be willing to underwrite or to transfer such models to new geographies.

Another example of an innovative financing solution is the Emergent Forest Finance Accelerator, which provides a price floor for suppliers and aggregates fragmented supply to fulfill larger tickets for buyers (see "Case study: Emergent Forest Finance Accelerator").

Intermediaries and aggregation

As a result of its OTC structures, the carbon market is currently short on intermediaries at several levels. On the one hand, intermediaries lack the ability to aggregate supply from standalone projects in order to satisfy demand for larger tickets from heavy emitters. While the supply is available in theory, NCS projects often involve multiple players in remote locations, and developers span different jurisdictions, certification methodologies and continents.

On the other hand, the market also lacks financial intermediaries that can provide liquidity via structured financial products and raise up-front capital. New actors such as Emergent have begun to fill this void, focusing specifically on bridging the jurisdictional–project divide for REDD+ credits. Similar approaches could be envisaged for other NCS sources. This could also open the door for credit-rating agencies to assess the financial soundness of products offered.

BOX 9

Case study: Emergent Forest Finance Accelerator

Established in 2019 by the Environmental Defense Fund, in partnership with the government of Norway, Emergent aims to "channel new sources of funding and finance to accelerate the speed and scale of tropical forest conservation". Emergent is a jurisdictional-level approach, using a public-private model to create long-term, large-scale incentives for forest protection by guaranteeing the purchase of forest nations' credits. All Emergent credits are measured and verified according to the Architecture for Redd+ Transactions – the Redd+ Environmental Excellence Standard (ART-TREES), mitigating leakage concerns, avoiding double counting and assuring environmental integrity. Moreover, third-party financial intermediaries ensure funds flowing back to forest nations are used for forest conservation.

On the supply side, the fund guarantees the purchase of credits from forest nations by purchasing a put option, essentially acting as a price floor. This provides much-needed certainty to forest nations and guarantees a results-based payment, with the option open to receive a higher payment from private funders in the future. This provides huge benefits for forest nations, such as: (1) predictable demand; (2) a minimum price guarantee; and (3) access to Emergent's marketing to private buyers, with the potential for upside if carbon prices rise.

Emergent provides benefits to buyers, too. It acts as a single platform for standardized, verified, high-quality REDD+ credits, providing an easy and convenient way to purchase credits without negotiating with individual jurisdictions. By removing friction, this will help stimulate demand.

3.5 Key Action #5: Create regulatory clarity

While many of the barriers to scale in the NCS space are of a technical nature and can be addressed through monitoring frameworks, certification and financial architecture, others are political in nature and require stakeholder collaboration, international consensus-building and the formulation of coherent policy frameworks in line with international climate goals.

Domestic markets

As of late 2020, current country commitments put the world on track to 2.1°C warming, meaning that, for the first time in history, global pledges are nearing the international goals stated in the Paris Agreement.[27]

To succeed, however, these commitments need to be turned into actionable policy plans and binding regulation. While about 130 nationally determined contributions (NDCs) include the use of nature for climate mitigation and adaptation purposes,[28] further work is needed to translate commitment into policy certainty for suppliers. Beyond creating nature action plans based on existing commitments, it has been suggested that industrialized nations ought to earmark a share of their NDC achievement towards NCS, particularly to address emissions from land-use sectors.

Binding targets for emitters would serve to increase the pressure to implement low-carbon mitigation options and also increase the demand for quality credits on the one hand while building long-term visibility for suppliers on the other. In the same breath, policy-makers have an opportunity to harmonize standards for subnational, national and international use. Creating a core carbon standard is the central recommendation of the TSVCM. Domestic schemes in several countries and jurisdictions, including Colombia, California and Costa Rica, have succeeded in integrating forestry credits into carbon pricing schemes, raising millions in government revenues.

Project-level approaches and jurisdictional programmes: towards integration

An ongoing debate in the forestry space (relating to Reducing Emissions from Deforestation and Forest Degradation, REDD+) has been the appropriate level of project implementation and accounting. Although the line is beginning to blur, there are primarily two levels to consider.

Jurisdictional approaches focus on the political level at which the local land-use policy is set. This allows an alignment of land-use policy with climate targets, as well as an integrated landscape approach taking into account the ecology of the entirety of the forest. Under the 2013 UNFCCC Warsaw Framework,[29] any country that submits a forest reference emission level for technical assessment determines the baseline against which all results are measured.[30] Only jurisdictional progress can therefore count towards a country's Paris Agreement climate goals; individual projects would need to demonstrate their results against the set baseline under a process termed "nesting" to ensure the individual project does not inflate its own baseline. Project-based approaches have created incongruencies in the past, including inflated baselines at the site level, while integrated land-use or jurisdictional approaches have been shown to lead to better conservation outcomes, as well as enabling the scaling of co-benefits and counteracting leakage. However, given the complexity of implementation, there is currently a limited supply of jurisdictional credits in the market.

Project-level approaches on the other hand engage with private and sometimes public landowners earning credits for site-specific actions. In the past decade, projects around the world have demonstrated multiple environmental benefits and created jobs in collaboration with local communities. While project-level activities currently supply the bulk of forestry credits, the leading concern has been the migration of deforestation activities to an area outside the project boundaries (leakage). Leakage needs to be estimated upfront and minimized. Proponents of project-level activities suggest that more agile implementation and private-sector investment are the current backbone of forest conservation.

At the same time, the forest finance accelerator Emergent has entered the market to help aggregate jurisdictional-scale credits from leading jurisdictions and make them available to corporate purchasers, as well as funnelling philanthropic finance into forest protection (see "Case study: Emergent Forest Finance Accelerator").

A twin-track approach

While there is growing agreement that a jurisdictional approach is critical to delivering better sustainability outcomes in the long run, jurisdictional action still requires innovative community- or project-level approaches. In addition, the current shortage of jurisdictional-scale credits being generated requires a transition approach to allow for upfront finance to flow from private actors as jurisdictions build up capacity.

Many forest countries, including Colombia, Guatemala, Peru and Cambodia, are already developing nested systems to allow the integration of projects into national accounting systems. Standards such as Verra's Jurisdictional and Nested REDD+ (JNR) are providing the tools to allow standalone projects to fully embed themselves into larger jurisdictional programmes. The TSVCM considered the following guardrails to phase standalone projects into nested programmes:

- Where REDD+ activities or pools are accounted for by the country at the jurisdictional scale, all such project activities must be nested within that programme
- For activities not accounted for at the jurisdictional scale, projects can operate on a standalone basis (i.e. they are not required to be nested within a jurisdictional programme)
- Where previous activities are subsequently included in a jurisdictional programme, credits from standalone activities would no longer be eligible (after a reasonable grace period)

BOX 10

Case study: Peru's approach to "nesting"

Peru has led the way in adopting a "nested" approach to attracting large sources of sustainable and scalable private finance to REDD+ projects. Nesting refers to the practice of embedding individual, project-level REDD+ into jurisdictional-level programmes, with the aim of ensuring environmental integrity by: (1) requiring adherence to high environmental standards; (2) ensuring emission reductions are accurately quantified; and (3) removing the risk of double counting. Peru began with a pilot scheme focused only on the country's natural protected areas and with projects verified under the Verra Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity (CCB) Standard. The projects calculated their net emission reductions using their existing baselines under the standards, and if any of these net reductions were sold as credits internationally, they were removed from Peru's national inventory. This ensured there was no double counting, meaning that projects generating credits that were sold abroad did not also count towards Peru's nationally determined contributions under the UN Paris Agreement.

As well as mitigating the risks of double counting, Peru's nested approach has attracted a sustainable source of finance. Peruvian REDD+ credits can now be sold into voluntary or compliance markets since safeguards are a key requirement of the Article 6 market mechanism and for tradability in programmes such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

Connecting voluntary and compliance markets

Voluntary and compliance carbon markets are closely linked and can have knock-on effects across demand, supply, price and market infrastructure. For instance, in recent years Colombia has introduced a carbon tax that can be met by surrendering voluntary carbon market credits. As a result, demand for voluntary carbon credits has increased. Similarly, CORSIA is an internationally binding compliance agreement, yet it allows a wide range of methodologies provided by voluntary standards.

If compliance markets were to include NCS credits as part of their ambition, this could greatly increase scale. What is more, compliance markets could draw on the experience of NCS crediting in voluntary markets to do so. The TSVCM provides us with a blueprint for this that could later be adopted by governments.

Building international markets: the Paris Agreement

One of the most notable drivers for scale in carbon markets is international treaties, including the Paris Agreement. Article 6 of the Paris Agreement governs the international transfer of carbon credits. In practice, this might take the form of bilateral agreements between nations – carbon market clubs whereby a select group of countries enters into a multilateral agreement, or a global international trading framework.

The International Emissions Trading Association (IETA) found that implementing an international carbon market under the Paris Agreement could lead to cost reductions of $250 billion per year in 2030 and facilitate additional abatement by 50%, or approximately 5Gt CO_2e per year in 2030.[31]

However, the lack of international markets does not preclude the significant scale-up of markets. Action is possible at the level of individuals, corporates, sectors and national/subnational government.

During the UN Climate Change Conference COP25 in Madrid in December 2019, 32 countries joined forces to call for high-ambition and high-integrity international carbon markets. The 11 principles, known as the San José Principles, outline the minimum requirements to achieve integrity of the carbon markets, which include ensuring environmental integrity, avoiding double counting, and using publicly accessible market infrastructure.[32]

3.6 Key Action #6: Build trust

Beyond the technical hurdles addressed in earlier recommendations, there is a need for greater collaboration and shared ideas in the space, exemplified and exacerbated by the perceived credibility issues of NCS.

In order to ensure high-quality NCS are used to achieve global net-zero goals, it has become mission critical to build trust among actors and convene like-minded stakeholders. In some sectors, such as agriculture and forestry, NCS provide the opportunity for farmers to change practices and achieve long-term reductions. In others, NCS can help sequester carbon dioxide, and serve as a compensation measure for companies on a net-zero pathway. While there is disagreement on some of the conceptual approaches, there is general agreement on the need for NCS as part of a net-zero strategy as well as the urgency to provide new sources of finance for forests.

A coalition of high-level champions can help amplify the call for high-quality, high-ambition NCS while committing to ratcheting up ambitions over time. Such a coalition would amplify best practices, highlight advances in measurement and verification to increase credibility, and endorse scientific advances towards net-zero certification. Perhaps most importantly, such a coalition can begin to build trust across different stakeholder groups in a small, close-knit group setting. With deeply ingrained divisions over the conceptual and theoretical approaches and perceptions on NCS, there is a fundamental need to find common ground. Agreement is required to put differences aside and address what is needed at a pragramatic level instead of the persistent debates – on the role of nature for net zero, corporate claims, corresponding adjustments, and the integration of jurisdictional and project-level approaches – that have slowed progress for too long.

Building these communities of trust critically involves closer collaboration with resource-endowed countries and jurisdictions that may host NCS projects, such as the HFLD countries. The success or failure of any NCS project is rooted in the country's ability to provide an adequate economic, legal and policy environment. Carbon finance offers one vehicle to ensure funds for conservation projects and increase climate finance flows, but it cannot succeed without being appropriately anchored within local administrations. Multistakeholder cooperation is required to connect project developers, credit purchasers and relevant administrations so they can find common ground for charting a way forward for NCS development.

In addition to a high-ambition coalition, a consistent public narrative must be built. There is a tremendous need to increase awareness and build trust in NCS, with honest reflection of their limitations, to help steer the narrative beyond the current perception of offsetting. This would help alleviate some of the confusion that has arisen about the benefits of conservation projects that rely on avoidance credits as a source of financing.

BOX 11 **The Natural Climate Solutions Alliance**

The Natural Climate Solutions Alliance is a multistakeholder platform convened by the World Economic Forum and the World Business Council for Sustainable Development. The express aim of the Alliance is to enable NCS to reach their full potential to help deliver the Paris climate goals as well as solutions to some of the world's most pressing and intractable environmental and social challenges, including biodiversity and forest loss, land degradation, sustainable water management and sustainable community livelihoods, starting today.

The NCS Alliance creates a space for credit originators, corporate buyers and civil society organizations to come together to explore common ground on critical questions such as demand-side eligibility and supply integrity. The Alliance also serves as a forum for knowledge sharing and technical capacity building. The platform aims to connect existing initiatives, open up new channels of communication and send a high-ambition, high-integrity signal from corporate buyers.

The NCS Alliance operates along four guiding principles:

1. NCS should be used in conjunction with the GHG emissions mitigation hierarchy: avoiding and reducing emissions should be prioritized and continue in addition to the use of NCS credits.
2. NCS credits can provide an interim solution for hard-to-abate emissions but not a permanent one. For certain unavoidable emissions, carbon sinks – potentially including natural sinks – will always be needed to achieve net zero. NCS credits should be considered an enabling solution that will support long-term sustainable land use.
3. NCS investments should follow rigorous environmental and social safeguards, which may help generate other benefits in line with the UN SDGs.
4. Sound and verified carbon measurement and accounting methodologies must be applied to ensure the high integrity of NCS credits.

4 Conclusion

NCS offer one promising and scalable set of solutions that can deliver multiple benefits for nature and people if executed well.

NCS can play a crucial role in addressing the converging environmental crises we face – the accelerating destruction of nature and climate change – producing a positive impact even beyond these crises. NCS investments today are being fuelled by corporate and country net-zero commitments.

While efforts on carbon market architecture will positively affect overall investment flows to climate solutions, there is still work to do to scale investment into NCS. In addition, it is vital to ensure these increased flows help to maximize the benefits for nature and local communities. The adoption of TSVCM recommendations would build efficient frictionless carbon markets, increase liquidity and value co-benefits, as well as having the potential to make higher-cost NCS viable through improved pricing of positive externalities.

Today, we know how to address the economic, biophysical and methodological constraints holding back NCS. However, it remains important to acknowledge that many of the constraints are political or conceptual in nature and will require collaboration, multistakeholder alliances and a concerted effort to bridge the prevailing disagreements.

This year, 2021, is a year to challenge ourselves collectively to overcome these barriers and accelerate progress. We urgently need to unlock new financing flows to enable a green recovery from COVID-19, and NCS offer one promising and scalable set of solutions that can deliver multiple benefits for nature and people if executed well. Important conferences scheduled for this year, including the Convention on Biological Diversity, the UN Climate Change Conference and the UN Food Systems Summit, provide a perfect backdrop to unlocking international public–private progress.

This report has set out an action agenda, describing some of the challenges and potential solutions, in order to accelerate the scale-up of NCS with markets as the foundation. The time to execute the agenda is now – not just because the climate change crisis is upon us but also because the momentum to address the crisis is growing and decisions about the role of nature in climate solutions being made today will have implications over many years to come.

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